

Claims

1           1.       (Currently Amended) A method for recovering from a failure in a  
2 network, comprising:  
3           sending a first set of information from a source to a destination via a first route;  
4           detecting a failure along said first route;  
5           in response to said failure, directing a message to said source informing said  
6 source of said failure; and  
7           in response to said message, sending a future set of information from said source  
8 to said destination via an alternate route;  
9           wherein directing said message to said source comprises:  
10                 identifying said source;  
11                 accessing a routing table which comprises one or more routes to said  
12                 source;  
13                 obtaining a return route from said routing table; and  
14                 sending said message to said source via said return route.

1           2.       (Original) The method of claim 1, further comprising:  
2           in response to said message, preventing other sets of information from being sent  
3 from said source to said destination via said first route.

1           3.       (Original) The method of claim 1, where said first set of information  
2 comprises a data portion, and wherein said method further comprises:

3           in response to said message, resending at least said data portion of said first set of  
4   information from said source to said destination via said alternate route.

1           4.       (Original) The method of claim 3, wherein said message comprises said  
2   data portion such that said data portion is returned to said source.

1           5-6     Canceled

1           7.       (Currently Amended) The method of claim ~~6~~ 1, wherein identifying said  
2   source comprises:  
3           extracting from said first set of information an identifier which identifies said  
4   source.

1           8.       Canceled

1           9.       (Original) The method of claim 1, wherein said method is implemented  
2   on a routing layer of said network.

1           10.      (Original) The method of claim 1, wherein said method is implemented  
2   within a router of said network.

1           11.      (Currently Amended) A method, implemented within a router of a  
2   network, for recovering from a failure, comprising:

3            sending a first set of information from an ingress module to an egress module via  
4   a first route;  
5            detecting a failure in said first route;  
6            in response to said failure, directing a message to said ingress module informing  
7   said ingress module of said failure; and  
8            in response to said message, sending a future set of information from said ingress  
9   module to said egress module via an alternate route;  
10          wherein directing said message to said ingress module comprises:  
11                  identifying said ingress module;  
12                  accessing a routing table which comprises one or more routes to said  
13                  ingress module;  
14                  obtaining a return route from said routing table; and  
15                  sending said message to said ingress module via said return route.

1            12.      (Currently Amended) The method of claim 11, wherein said first route  
2   and said alternate route are predetermined and stored within a second routing table.

1            13.      (Currently Amended) The method of claim 12, wherein sending said  
2   future set of information comprises:  
3            selecting said alternate route from said second routing table.

1            14.      (Original) The method of claim 11, further comprising:

2 in response to said message, preventing other sets of information from being sent  
3 from said ingress module to said egress module via said first route.

1 15. (Currently Amended) The method of claim 14, wherein said first route  
2 and said alternate route are predetermined and stored within a second routing table, and  
3 wherein preventing comprises:  
4 replacing said first route with said alternate route in said second routing table.

1 16. (Currently Amended) The method of claim 11, wherein said first set of  
2 information comprises a data portion, and wherein said method further comprises:  
3 in response to said message, resending at least said data portion of said first set of  
4 information from said ingress module to said egress module via said alternate route for  
5 forwarding to ~~said~~ a destination.

1 17. (Original) The method of claim 16, wherein said message comprises said  
2 data portion such that said data portion is returned to said ingress module.

1 18. Canceled

1 19. (Currently Amended) The method of claim ~~18~~ 11, wherein identifying  
2 said ingress module comprises:  
3 extracting from said first set of information an identifier which identifies said  
4 ingress module.

1           20.    (Original) The method of claim 11, wherein said ingress module  
2 comprises an ingress line card, and said egress module comprises an egress line card.

1           21.    (Currently Amended) A method, implemented within a router of a  
2 network, for recovering from a failure, comprising:  
3           sending a first set of information from an ingress module to a first egress module  
4 for forwarding by said first egress module to a destination external to said router;  
5           detecting a failure of said first egress module;  
6           in response to said failure of said first egress module, directing a message to said  
7 ingress module informing said ingress module of said first egress module failure;  
8           in response to said message, selecting an alternate egress module capable of  
9 forwarding information to said destination; and  
10          sending a future set of information from said ingress module to said alternate  
11 egress module for forwarding to said destination;  
12          wherein directing said message to said ingress module comprises:  
13                 identifying said ingress module;  
14                 accessing a routing table which comprises one or more routes to said  
15                 ingress module;  
16                 obtaining a return route from said routing table; and  
17                 sending said message to said ingress module via said return route.

1           22.     (Original) The method of claim 21, wherein said first set of information  
2     and said future set of information are both part of a flow, and wherein said method  
3     further comprises:  
4           in response to said message, preventing other sets of information associated with  
5     said flow from being sent from said ingress module to said first egress module.

1           23.     (Original) The method of claim 22, wherein said first egress module and  
2     said alternate egress module are predetermined, wherein identifiers associated with said  
3     first egress module and said alternate egress module are stored within a flow block  
4     associated with said flow, and wherein preventing comprises:  
5           storing an indication in said flow block that all sets of information associated with  
6     said flow are not to be sent to said first egress module.

1           24.     (Currently Amended) The method of claim 21, wherein said first set of  
2     information and said future set of information are both part of a flow, and wherein said  
3     method further comprises:  
4           in response to said message, causing ~~said~~ other sets of information associated with  
5     said flow to be sent from said ingress module to said alternate egress module.

1           25.     (Original) The method of claim 24, wherein said first egress module and  
2     said alternate egress module are predetermined, wherein identifiers associated with said  
3     first egress module and said alternate egress module are stored within a flow block  
4     associated with said flow, and wherein causing comprises:

5 storing an indication in said flow block that all sets of information associated with  
6 said flow are to be sent to said alternate egress module.

1 26. (Original) The method of claim 21, wherein said first set of information  
2 and said future set of information are both part of a flow, wherein said first egress module  
3 and said alternate egress module are predetermined, wherein identifiers associated with  
4 said first egress module and said alternate egress module are stored within a flow block  
5 associated with said flow, and wherein selecting said alternate egress module comprises:  
6 accessing said flow block to access the identifier associated with said alternate  
7 egress module.

1 27. (Original) The method of claim 21, wherein said first set of information  
2 comprises a data portion, and wherein said method further comprises:  
3 in response to said message, resending at least said data portion of said first set of  
4 information from said ingress module to said alternate egress module for forwarding to  
5 said destination.

1 28. (Original) The method of claim 27, wherein said message comprises said  
2 data portion such that said data portion is returned to said ingress module.

1 29. Canceled

1           30.     (Currently Amended) The method of claim ~~29~~ 21, wherein identifying  
2     said ingress module comprises:  
3           extracting from said first set of information an identifier which identifies said  
4     ingress module.

1           31.     (Original) The method of claim 21, wherein said ingress module  
2     comprises an ingress line card, said first egress module comprises a first egress line card,  
3     and said alternate egress module comprises a second egress line card.

1           32.     (Original) The method of claim 21, wherein said method is implemented  
2     on a routing layer of said network.

1           33.     (Currently Amended) A method, implemented within a router of a  
2     network, for recovering from a failure, comprising:  
3           sending a first set of information from an ingress module to a first egress module  
4     for forwarding by said first egress module to a destination external to said router;  
5           detecting an external failure beyond said first egress module;  
6           in response to said external failure, directing a message to said ingress module  
7     informing said ingress module of said external failure;  
8           in response to said message, selecting an alternate egress module capable of  
9     forwarding information to said destination; and  
10          sending a future set of information from said ingress module to said alternate  
11     egress module for forwarding to said destination;



12        wherein directing said message to said ingress module comprises:  
13                identifying said ingress module;  
14                accessing a routing table which comprises one or more routes to said  
15                ingress module;  
16                obtaining a return route from said routing table; and  
17                sending said message to said ingress module via said return route.

1            34.     (Original) The method of claim 33, wherein said first set of information  
2        and said future set of information are both part of a flow, and wherein said method  
3        further comprises:  
4            in response to said message, preventing other sets of information associated with  
5        said flow from being sent from said ingress module to said first egress module.

1            35.     (Original) The method of claim 34, wherein said first egress module and  
2        said alternate egress module are predetermined, wherein identifiers associated with said  
3        first egress module and said alternate egress module are stored within a flow block  
4        associated with said flow, and wherein preventing comprises:  
5            storing an indication in said flow block that all sets of information associated with  
6        said flow are not to be sent to said first egress module.

1            36.     (Currently Amended) The method of claim 33, wherein said first set of  
2        information and said future set of information are both part of a flow, and wherein said  
3        method further comprises:

4           in response to said message, causing ~~said~~ other sets of information associated with  
5   said flow to be sent from said ingress module to said alternate egress module.

1           37.    (Original) The method of claim 36, wherein said first egress module and  
2   said alternate egress module are predetermined, wherein identifiers associated with said  
3   first egress module and said alternate egress module are stored within a flow block  
4   associated with said flow, and wherein causing comprises:  
5           storing an indication in said flow block that all sets of information associated with  
6   said flow are to be sent to said alternate egress module.

1           38.    (Original) The method of claim 33, wherein said first set of information  
2   and said future set of information are both part of a flow, wherein said first egress module  
3   and said alternate egress module are predetermined, wherein identifiers associated with  
4   said first egress module and said alternate egress module are stored within a flow block  
5   associated with said flow, and wherein selecting said alternate egress module comprises:  
6           accessing said flow block to access the identifier associated with said alternate  
7   egress module.

1           39.    (Original) The method of claim 33, wherein said first set of information  
2   comprises a data portion, and wherein said method further comprises:  
3           in response to said message, resending at least said data portion of said first set of  
4   information from said ingress module to said alternate egress module for forwarding to  
5   said destination.

1           40.     (Original) The method of claim 39, wherein said message comprises said  
2 data portion such that said data portion is returned to said ingress module.

1           41.     Canceled

1           42.     (Currently Amended) The method of claim ~~41~~ 33, wherein identifying  
2 said ingress module comprises:  
3           extracting from said first set of information an identifier which identifies said  
4 ingress module.

1           43.     (Original) The method of claim 33, wherein said ingress module  
2 comprises an ingress line card, said first egress module comprises a first egress line card,  
3 and said alternate egress module comprises a second egress line card.

1           44.     (Original) The method of claim 33, wherein said method is implemented  
2 on a routing layer of said network.

1           45.     (Original) The method of claim 33, wherein said external failure  
2 precludes said first egress module from forwarding said first set of information to said  
3 destination.

1           46.     (Currently Amended) A router, comprising:

2 an ingress module;  
 3 an egress module; and  
 4 a forwarding mechanism for forwarding information between said ingress module  
 5 and said egress module;

6 wherein said ingress module sends a first set of information to said forwarding  
 7 mechanism to be forwarded to said egress module via a first route, said forwarding  
 8 mechanism detecting a failure in said first route, and in response to said failure, said  
 9 forwarding mechanism directing a message to said ingress module informing said ingress  
 10 module of said failure, and in response to said message, said ingress module sending a  
 11 future set of information to said forwarding mechanism to be forwarded to said egress  
 12 module via an alternate route;

13 wherein said forwarding mechanism directs said message to said ingress module  
 14 by:

15 identifying said ingress module;

16 accessing a routing table which comprises one or more routes to said  
 17 ingress module;

18 obtaining a return route from said routing table; and

19 sending said message to said ingress module via said return route.

1 47. (Currently Amended) The router of claim 46, wherein said ingress  
 2 module comprises a memory, and wherein said first route and said alternate route are  
 3 predetermined and stored within a second routing table in said memory.

1           48.     (Currently Amended) The router of claim 47, wherein said ingress  
2 module selects said alternate route from said second routing table.

1           49.     (Original) The router of claim 46, wherein said ingress module, in  
2 response to said message, prevents other sets of information from being sent from said  
3 ingress module to said egress module via said first route.

1           50.     (Currently Amended) The router of claim 49, wherein said ingress  
2 module comprises a memory, wherein said first route and said alternate route are  
3 predetermined and stored within a second routing table in said memory, and wherein said  
4 ingress module prevents other sets of information from being sent from said ingress  
5 module to said egress module via said first route by replacing said first route with said  
6 alternate route in said second routing table.

1           51.     (Original) The router of claim 46, wherein said first set of information  
2 comprises a data portion, and wherein said ingress module, in response to said message,  
3 resends at least said data portion of said first set of information to said forwarding  
4 mechanism to be forwarded to said egress module via said alternate route.

1           52.     (Original) The router of claim 51, wherein said forwarding mechanism  
2 includes said data portion in said message such that said data portion is returned by said  
3 forwarding mechanism to said ingress module.

1           53.     Canceled

1           54.     (Currently Amended) The router of claim ~~53~~ 46, wherein said forwarding  
2 mechanism identifies said ingress module by extracting from said first set of information  
3 an identifier which identifies said ingress module.

1           55.     (Original) The router of claim 46, wherein said ingress module comprises  
2 an ingress line card, said egress module comprises an egress line card, and said  
3 forwarding mechanism comprises a switching fabric.

1           56.     (Original) The router of claim 55, wherein said switching fabric  
2 comprises a fabric card.

1           57.     (Currently Amended) A router, comprising:  
2 an ingress module;  
3 a first egress module;  
4 an alternate egress module; and  
5 a forwarding mechanism for forwarding information between said ingress  
6 module, said first egress module, and said alternate egress module;  
7 wherein said ingress module sends a first set of information to said forwarding  
8 mechanism to be forwarded to said first egress module, said first set of information  
9 intended to be forwarded by said first egress module to a destination external to said  
10 router, said forwarding mechanism detecting a failure which precludes forwarding of said

11 first set of information to said first egress module, and in response to said failure, said  
12 forwarding mechanism directing a message to said ingress module informing said ingress  
13 module of said failure, and based upon said message, said ingress module determining  
14 that said first egress module has failed, and in response to said message, said ingress  
15 module selecting said alternate egress module and sending a future set of information to  
16 said forwarding mechanism to be forwarded to said alternate egress module, said future  
17 set of information intended to be forwarded by said alternate egress module to said  
18 destination;

19 wherein said forwarding mechanism directs said message to said ingress module  
20 by:

21 identifying said ingress module;  
22 accessing a routing table which comprises one or more routes to said  
23 ingress module;  
24 obtaining a return route from said routing table; and  
25 sending said message to said ingress module via said return route.

1 58. (Original) The router of claim 57, wherein said first set of information  
2 and said future set of information are both part of a flow, and wherein said ingress  
3 module, in response to said message, prevents other sets of information associated with  
4 said flow from being sent from said ingress module to said first egress module.

1 59. (Original) The router of claim 58, wherein said first egress module and  
2 said alternate egress module are predetermined, wherein said ingress module comprises a

3 memory, wherein identifiers associated with said first egress module and said alternate  
 4 egress module are stored within a flow block associated with said flow, said flow block  
 5 being stored in said memory, and wherein said ingress module prevents other sets of  
 6 information associated with said flow from being sent from said ingress module to said  
 7 first egress module by storing an indication in said flow block that all sets of information  
 8 associated with said flow are not to be sent to said first egress module.

1 60. (Currently Amended) The router of claim 57, wherein said first set of  
 2 information and said future set of information are both part of a flow, and wherein said  
 3 ingress module, in response to said message, causes ~~said~~ other sets of information  
 4 associated with said flow to be sent from said ingress module to said alternate egress  
 5 module via said forwarding mechanism.

1 61. (Currently Amended) The router of claim 60, wherein said first egress  
 2 module and said alternate egress module are predetermined, wherein said ingress module  
 3 comprises a memory, wherein identifiers associated with said first egress module and  
 4 said alternate egress module are stored within a flow block associated with said flow, said  
 5 flow block being stored in said memory, and wherein said ingress module causes ~~said~~  
 6 other sets of information associated with said flow to be sent from said ingress module to  
 7 said alternate egress module by storing an indication in said flow block that all sets of  
 8 information associated with said flow are to be sent to said alternate egress module.



1           62.     (Original) The router of claim 57, wherein said first set of information  
2     and said future set of information are both part of a flow, wherein said first egress module  
3     and said alternate egress module are predetermined, wherein said ingress module  
4     comprises a memory, wherein identifiers associated with said first egress module and  
5     said alternate egress module are stored within a flow block associated with said flow, said  
6     flow block being stored in said memory, and wherein said ingress module selects said  
7     alternate egress module by accessing said flow block to access the identifier associated  
8     with said alternate egress module.

1           63.     (Original) The router of claim 57, wherein said first set of information  
2     comprises a data portion, and wherein said ingress module, in response to said message,  
3     resends at least said data portion of said first set of information to said forwarding  
4     mechanism to be forwarded to said alternate egress module for forwarding to said  
5     destination.

1           64.     (Original) The router of claim 63, wherein said forwarding mechanism  
2     includes said data portion in said message such that said data portion is returned by said  
3     forwarding mechanism to said ingress module.

1           65.     Canceled

1           66.     (Currently Amended) The router of claim 65 57, wherein said forwarding  
2 mechanism identifies said ingress module by extracting from said first set of information  
3 an identifier which identifies said ingress module.

1           67.     (Original) The router of claim 57, wherein said ingress module comprises  
2 an ingress line card, said first egress module comprises a first egress line card, said  
3 alternate egress module comprises a second egress line card, and said forwarding  
4 mechanism comprises a switching fabric.

1           68.     (Original) The router of claim 67, wherein said switching fabric  
2 comprises a fabric card.

1           69.     (Currently Amended) A router, comprising:  
2 an ingress module;  
3 a first egress module;  
4 an alternate egress module; and  
5 a forwarding mechanism for forwarding information between said ingress  
6 module, said first egress module, and said alternate egress module;  
7 wherein said ingress module sends a first set of information to said forwarding  
8 mechanism to be forwarded to said first egress module, said first set of information  
9 intended to be forwarded by said first egress module to a destination external to said  
10 router, said first egress module detecting an external failure which precludes said first  
11 egress module from forwarding said first set of information to said destination, and in

12 response to said external failure, said first egress module directing a message to said  
13 ingress module informing said ingress module of said external failure, and in response to  
14 said message, said ingress module selecting said alternate egress module and sending a  
15 future set of information to said forwarding mechanism to be forwarded to said alternate  
16 egress module, said future set of information intended to be forwarded by said alternate  
17 egress module to said destination;

18 wherein said first egress module directs said message to said ingress module by:

19 identifying said ingress module;

20 accessing a routing table which comprises one or more routes to said

21 ingress module;

22 obtaining a return route from said routing table; and

23 sending said message to said ingress module via said return route.

1 70. (Original) The router of claim 69, wherein said first set of information  
2 and said future set of information are both part of a flow, and wherein said ingress  
3 module, in response to said message, prevents other sets of information associated with  
4 said flow from being sent from said ingress module to said first egress module.

1 71. (Original) The router of claim 70, wherein said first egress module and  
2 said alternate egress module are predetermined, wherein said ingress module comprises a  
3 memory, wherein identifiers associated with said first egress module and said alternate  
4 egress module are stored within a flow block associated with said flow, said flow block  
5 being stored in said memory, and wherein said ingress module prevents other sets of

6 information associated with said flow from being sent from said ingress module to said  
 7 first egress module by storing an indication in said flow block that all sets of information  
 8 associated with said flow are not to be sent to said first egress module.

1 72. (Currently Amended) The router of claim 69, wherein said first set of  
 2 information and said future set of information are both part of a flow, and wherein said  
 3 ingress module, in response to said message, causes ~~said~~ other sets of information  
 4 associated with said flow to be sent from said ingress module to said alternate egress  
 5 module via said forwarding mechanism.

1 73. (Currently Amended) The router of claim 72, wherein said first egress  
 2 module and said alternate egress module are predetermined, wherein said ingress module  
 3 comprises a memory, wherein identifiers associated with said first egress module and  
 4 said alternate egress module are stored within a flow block associated with said flow, said  
 5 flow block being stored in said memory, and wherein said ingress module causes ~~said~~  
 6 other sets of information associated with said flow to be sent from said ingress module to  
 7 said alternate egress module by storing an indication in said flow block that all sets of  
 8 information associated with said flow are to be sent to said alternate egress module.

1 74. (Original) The router of claim 69, wherein said first set of information  
 2 and ~~said~~ future set of information are both part of a flow, wherein said first egress module  
 3 and said alternate egress module are predetermined, wherein said ingress module  
 4 comprises a memory, wherein identifiers associated with said first egress module and

5 said alternate egress module are stored within a flow block associated with said flow, said  
6 flow block being stored in said memory, and wherein said ingress module selects said  
7 alternate egress module by accessing said flow block to access the identifier associated  
8 with said alternate egress module.

1 75. (Original) The router of claim 69, wherein said first set of information  
2 comprises a data portion, and wherein said ingress module, in response to said message,  
3 resends at least said data portion of said first set of information to said forwarding  
4 mechanism to be forwarded to said alternate egress module for forwarding to said  
5 destination.

1 76. (Original) The router of claim 75, wherein said first egress module  
2 includes said data portion in said message such that said data portion is returned by said  
3 first egress module to said ingress module.

1 77. Canceled

1 78. (Currently Amended) The router of claim ~~77~~ 69, wherein said first egress  
2 module identifies said ingress module by extracting from said first set of information an  
3 identifier which identifies said ingress module.

1 79. (Original) The router of claim 69, wherein said ingress module comprises  
2 an ingress line card, said first egress module comprises a first egress line card, said

3 alternate egress module comprises a second egress line card, and said forwarding  
4 mechanism comprises a switching fabric.

1 80. (Original) The router of claim 79, wherein said switching fabric  
2 comprises a fabric card.

1 81. (Currently Amended) A method implemented by a forwarding  
2 mechanism in a router, comprising:  
3 receiving a set of information sent by an ingress module intended to be forwarded  
4 to an egress module via a particular route;  
5 detecting a failure in said particular route; and  
6 in response to said failure, directing a message to said ingress module informing  
7 said ingress module of said failure;  
8 wherein directing said message to said ingress module comprises:  
9 identifying said ingress module;  
10 accessing a routing table which comprises one or more routes to said  
11 ingress module;  
12 obtaining a return route from said routing table; and  
13 sending said message to said ingress module via said return route.

1 82. (Original) The method of claim 81, wherein said set of information  
2 comprises a data portion, and wherein directing said message to said ingress module  
3 comprises:

4            returning said data portion to said ingress module.

1            83.     (Original) The method of claim 81, wherein said set of information  
2   comprises a data portion, and wherein directing said message to said ingress module  
3   comprises:  
4            including said data portion in said message such that said data portion is returned  
5   to said ingress module.

1            84.     Canceled

1            85.     (Currently Amended) The method of claim ~~84~~ 81, wherein identifying  
2   said ingress module comprises:  
3            extracting from said first set of information an identifier which identifies said  
4   ingress module.

1            86.     Canceled

1            87.     (Currently Amended) A forwarding mechanism in a router, comprising:  
2            a mechanism for receiving a set of information sent by an ingress module  
3   intended to be forwarded to an egress module via a particular route;  
4            a mechanism for detecting a failure in said particular route; and  
5            a mechanism for directing, in response to said failure, a message to said ingress  
6   module informing said ingress module of said failure;

7        wherein said forwarding mechanism further comprises a memory for storing a  
8        routing table which comprises one or more routes to said ingress module, and wherein the  
9        mechanism for directing said message to said ingress module comprises:

10                a mechanism for identifying said ingress module;

11                a mechanism for accessing said routing table;

12                a mechanism for obtaining a return route from said routing table; and

13                a mechanism for sending said message to said ingress module via said  
14                return route.

1                88.     (Original) The forwarding mechanism of claim 87, wherein said set of  
2        information comprises a data portion, and wherein the mechanism for directing said  
3        message to said ingress module comprises:

4                a mechanism for returning said data portion to said ingress module.

1                89.     (Original) The forwarding mechanism of claim 87, wherein said set of  
2        information comprises a data portion, and wherein the mechanism for directing said  
3        message to said ingress module comprises:

4                a mechanism for including said data portion in said message such that said data  
5        portion is returned to said ingress module.

i                90.     Canceled



1           91.     (Currently Amended) The forwarding mechanism of claim ~~90~~ 87, wherein  
2     the mechanism for identifying said ingress module comprises:  
3           a mechanism for extracting from said first set of information an identifier which  
4     identifies said ingress module.

1           92.     Canceled

1           93.     (Currently Amended) A method implemented by an egress module in a  
2     router, comprising:  
3           receiving a set of information sent by an ingress module intended to be forwarded  
4     by the egress module to a destination external to the router;  
5           detecting a failure external to the router which precludes the egress module from  
6     forwarding said set of information to said destination; and  
7           in response to said failure, directing a message to said ingress module informing  
8     said ingress module of said failure;  
9           wherein directing said message to said ingress module comprises:  
10           identifying said ingress module;  
11           accessing a routing table which comprises one or more routes to said  
12           ingress module;  
13           obtaining a return route from said routing table; and  
14           sending said message to said ingress module via said return route.  
15

1           94.     (Original) The method of claim 93, wherein said set of information  
2 comprises a data portion, and wherein directing said message to said ingress module  
3 comprises:  
4           returning said data portion to said ingress module.

1           95.     (Original) The method of claim 93, wherein said set of information  
2 comprises a data portion, and wherein directing said message to said ingress module  
3 comprises:  
4           including said data portion in said message such that said data portion is returned  
5 to said ingress module.

1           96.     Canceled

1           97.     (Currently Amended) The method of claim ~~96~~ 93, wherein identifying  
2 said ingress module comprises:  
3           extracting from said first set of information an identifier which identifies said  
4 ingress module.

1           98.     Canceled

1           99.     (Currently Amended) An egress module in a router, comprising:  
2           a mechanism for receiving a set of information sent by an ingress module  
3 intended to be forwarded by said egress module to a destination external to the router;

4 a mechanism for detecting a failure external to the router which precludes said  
5 egress module from forwarding said set of information to said destination; and

6 a mechanism for directing, in response to said failure, a message to said ingress  
7 module informing said ingress module of said failure;

8 wherein said egress module further comprises a memory for storing a routing  
9 table which comprises one or more routes to said ingress module, and wherein the  
10 mechanism for directing said message to said ingress module comprises:

11 a mechanism for identifying said ingress module;

12 a mechanism for accessing said routing table;

13 a mechanism for obtaining a return route from said routing table; and

14 a mechanism for sending said message to said ingress module via said

15 return route.

1 100. (Original) The egress module of claim 99, wherein said set of information  
2 comprises a data portion, and wherein the mechanism for directing said message to said  
3 ingress module comprises:

4 a mechanism for returning said data portion to said ingress module.

1 101. (Original) The egress module of claim 99, wherein said set of information  
2 comprises a data portion, and wherein the mechanism for directing said message to said  
3 ingress module comprises:

4 a mechanism for including said data portion in said message such that said data  
5 portion is returned to said ingress module.

1           102.   Canceled

1           103.   (Currently Amended) The egress module of claim ~~102~~ 99, wherein the  
2 mechanism for identifying said ingress module comprises:

3           a mechanism for extracting from said first set of information an identifier which  
4 identifies said ingress module.

1           104.   Canceled

1           105.   (Currently Amended) A method implemented by an ingress module in a  
2 router, comprising:

3           sending a first set of information to an egress module via a first route, said first set  
4 of information intended to be forwarded by the egress module to a destination external to  
5 the router;

6           receiving a message indicating that said first set of information did not reach the  
7 destination successfully;

8           determining based upon said message whether future sets of information should  
9 be sent to the egress module; and

10          in response to a determination that future sets of information should be sent to the  
11 egress module, sending a future set of information to the egress module via an alternate  
12 route;

13        wherein it is determined that future sets of information should be sent to the  
14        egress module if: (a) said message does not indicate that the egress module has failed;  
15        and (2) said message does not indicate that an external failure, which would preclude the  
16        egress module from forwarding said first set of information to the destination, has  
17        occurred.

1            106.    Canceled

1            107.    (Original) The method of claim 105, wherein said first route and said  
2        alternate route are predetermined and stored within a routing table, and wherein sending  
3        said future set of information to the egress module comprises:  
4            selecting said alternate route from said routing table.

1            108.    (Original) The method of claim 105, further comprising:  
2            in response to a determination that future sets of information should be sent to the  
3        egress module, preventing said future sets of information from being sent to the egress  
4        module via said first route.

1            109.    (Original) The method of claim 108, wherein said first route and said  
2        alternate route are predetermined and stored within a routing table, and wherein  
3        preventing comprises:  
4            replacing said first route with said alternate route in said routing table.

1           110. (Original) The method of claim 105, wherein said first set of information  
2 comprises a data portion, and wherein said method further comprises:  
3           in response to a determination that future sets of information should be sent to the  
4 egress module, resending at least said data portion of said first set of information to the  
5 egress module via said alternate route.

1           111. (Original) The method of claim 110, wherein said message indicating that  
2 said first set of information did not reach the destination successfully comprises said data  
3 portion of said first set of information.

1           112. (Currently Amended) A method implemented by an ingress module in a  
2 router, comprising:  
3           sending a first set of information to a first egress module, said first set of  
4 information intended to be forwarded by the first egress module to a destination external  
5 to the router;  
6           receiving a message indicating that said first set of information did not reach the  
7 destination successfully;  
8           determining based upon said message whether future sets of information should  
9 be sent to the first egress module; and  
10          in response to a determination that future sets of information should not be sent to  
11 the first egress module, selecting an alternate egress module capable of forwarding  
12 information to the destination; and

13            sending a future set of information to the alternate egress module to be forwarded  
14    by the alternate egress module to the destination;  
15            wherein it is determined that future sets of information should not be sent to the  
16    first egress module if: (a) said message indicates that the first egress module has failed;  
17    or (2) said message indicates that an external failure, which would preclude the first  
18    egress module from forwarding said first set of information to the destination, has  
19    occurred.

1            113.    Canceled

1            114.    (Original) The method of claim 112, wherein said first set of information  
2    and said future set of information are both part of a flow, and wherein said method  
3    further comprises:  
4            in response to a determination that future sets of information should not be sent to  
5    the first egress module, preventing other sets of information associated with said flow  
6    from being sent to the first egress module.

1            115.    (Original) The method of claim 114, wherein said first egress module and  
2    said alternate egress module are predetermined, wherein identifiers associated with said  
3    first egress module and said alternate egress module are stored within a flow block  
4    associated with said flow, and wherein preventing comprises:  
5            storing an indication in said flow block that all sets of information associated with  
6    said flow are not to be sent to the first egress module.

1           116. (Original) The method of claim 112, wherein said first set of information  
2 and said future set of information are both part of a flow, and wherein said method  
3 further comprises:  
4           in response to a determination that future sets of information should not be sent to  
5 the first egress module, causing other sets of information associated with said flow to be  
6 sent to the alternate egress module.

1           117. (Original) The method of claim 116, wherein said first egress module and  
2 said alternate egress module are predetermined, wherein identifiers associated with said  
3 first egress module and said alternate egress module are stored within a flow block  
4 associated with said flow, and wherein causing comprises:  
5           storing an indication in said flow block that all sets of information associated with  
6 said flow are to be sent to the alternate egress module.

1           118. (Original) The method of claim 112, wherein said first set of information  
2 and said future set of information are both part of a flow, wherein said first egress module  
3 and said alternate egress module are predetermined, wherein identifiers associated with  
4 said first egress module and said alternate egress module are stored within a flow block  
5 associated with said flow, and wherein selecting the alternate egress module comprises:  
6           accessing said flow block to access the identifier associated with the alternate  
7 egress module.



1           119. (Original) The method of claim 112, wherein said first set of information  
2 comprises a data portion, and wherein said method further comprises:  
3           in response to a determination that future sets of information should not be sent to  
4 the first egress module, resending at least said data portion of said first set of information  
5 to the alternate egress module to be forwarded by the alternate egress module to the  
6 destination.

1           120. (Original) The method of claim 119, wherein said message indicating that  
2 said first set of information did not reach the destination successfully comprises said data  
3 portion of said first set of information.

1           121. (Currently Amended) An ingress module in a router, comprising:  
2           a mechanism for sending a first set of information to an egress module via a first  
3 route, said first set of information intended to be forwarded by the egress module to a  
4 destination external to the router;  
5           a mechanism for receiving a message indicating that said first set of information  
6 did not reach the destination successfully;  
7           a mechanism for determining based upon said message whether future sets of  
8 information should be sent to the egress module; and  
9           a mechanism for sending, in response to a determination that future sets of  
10 information should be sent to the egress module, a future set of information to the egress  
11 module via an alternate route;

12        wherein it is determined that future sets of information should be sent to the  
13        egress module if: (a) said message does not indicate that the egress module has failed;  
14        and (2) said message does not indicate that an external failure, which would preclude the  
15        egress module from forwarding said first set of information to the destination, has  
16        occurred.

1            122.    Canceled

1            123.    (Original) The ingress module of claim 121, wherein said ingress module  
2        comprises a memory, wherein said first route and said alternate route are predetermined  
3        and stored within a routing table in said memory, and wherein the mechanism for sending  
4        said future set of information to the egress module comprises:  
5            a mechanism for selecting said alternate route from said routing table.

1            124.    (Original) The ingress module of claim 121, further comprising:  
2            a mechanism for preventing, in response to a determination that future sets of  
3        information should be sent to the egress module, said future sets of information from  
4        being sent to the egress module via said first route.

1            125.    (Original) The ingress module of claim 124, wherein said ingress module  
2        comprises a memory, wherein said first route and said alternate route are predetermined  
3        and stored within a routing table in said memory, and wherein the mechanism for  
4        preventing comprises:

5           a mechanism for replacing said first route with said alternate route in said routing  
6   table.

1           126.   (Original) The ingress module of claim 121, wherein said first set of  
2   information comprises a data portion, and wherein said ingress module further comprises:  
3           a mechanism for resending, in response to a determination that future sets of  
4   information should be sent to the egress module, at least said data portion of said first set  
5   of information to the egress module via said alternate route.

1           127.   (Original) The ingress module of claim 126, wherein said message  
2   indicating that said first set of information did not reach the destination successfully  
3   comprises said data portion of said first set of information.

1           128.   (Currently Amended) An ingress module in a router, comprising:  
2           a mechanism for sending a first set of information to a first egress module, said  
3   first set of information intended to be forwarded by the first egress module to a  
4   destination external to the router;  
5           a mechanism for receiving a message indicating that said first set of information  
6   did not reach the destination successfully;  
7           a mechanism for determining based upon said message whether future sets of  
8   information should be sent to the first egress module; ~~and~~

9 a mechanism for selecting, in response to a determination that future sets of  
10 information should not be sent to the first egress module, an alternate egress module  
11 capable of forwarding information to the destination; and  
12 a mechanism for sending a future set of information to the alternate egress module  
13 to be forwarded by the alternate egress module to the destination;  
14 wherein it is determined that future sets of information should not be sent to the  
15 egress module if: (a) said message indicates that the first egress module has failed; or (2)  
16 said message indicates that an external failure, which would preclude the first egress  
17 module from forwarding said first set of information to the destination, has occurred.

1 129. Canceled

1 130. (Original) The ingress module of claim 128, wherein said first set of  
2 information and said future set of information are both part of a flow, and wherein said  
3 ingress module further comprises:  
4 a mechanism for preventing, in response to a determination that future sets of  
5 information should not be sent to the first egress module, other sets of information  
6 associated with said flow from being sent to the first egress module.

1 131. (Original) The ingress module of claim 130, wherein said ingress module  
2 comprises a memory, wherein the first egress module and the alternate egress module are  
3 predetermined, wherein identifiers associated with the first egress module and the  
4 alternate egress module are stored within a flow block associated with said flow, said

5 flow block being stored in said memory, and wherein the mechanism for preventing  
6 comprises:  
7 a mechanism for storing an indication in said flow block that all sets of  
8 information associated with said flow are not to be sent to the first egress module.

1 132. (Original) The ingress module of claim 128, wherein said first set of  
2 information and said future set of information are both part of a flow, and wherein said  
3 ingress module further comprises:  
4 a mechanism for causing, in response to a determination that future sets of  
5 information should not be sent to the first egress module, other sets of information  
6 associated with said flow to be sent to the alternate egress module.

1 133. (Original) The ingress module of claim 132, wherein said ingress module  
2 comprises a memory, wherein the said first egress module and the alternate egress  
3 module are predetermined, wherein identifiers associated with the first egress module and  
4 the alternate egress module are stored within a flow block associated with said flow, said  
5 flow block being stored in said memory, and wherein the mechanism for causing  
6 comprises:  
7 a mechanism for storing an indication in said flow block that all sets of  
8 information associated with said flow are to be sent to the alternate egress module.

1 134. (Original) The ingress module of claim 128, wherein said ingress module  
2 comprises a memory, wherein said first set of information and said future set of

3 information are both part of a flow, wherein the first egress module and the alternate  
4 egress module are predetermined, wherein identifiers associated with the first egress  
5 module and the alternate egress module are stored within a flow block associated with  
6 said flow, said flow block being stored in said memory, and wherein the mechanism for  
7 selecting the alternate egress module comprises:  
8 a mechanism for accessing said flow block to access the identifier associated with  
9 the alternate egress module.

1 135. (Original) The ingress module of claim 128, wherein said first set of  
2 information comprises a data portion, and wherein said ingress module further comprises:  
3 a mechanism for resending, in response to a determination that future sets of  
4 information should not be sent to the first egress module, at least said data portion of said  
5 first set of information to the alternate egress module to be forwarded by the alternate  
6 egress module to the destination.

1 136. (Original) The ingress module of claim 135, wherein said message  
2 indicating that said first set of information did not reach the destination successfully  
3 comprises said data portion of said first set of information.

1 137. (New) A method, implemented within a router of a network, for  
2 recovering from a failure, comprising:  
3 sending a first set of information from an ingress module to a first egress module  
4 for forwarding by said first egress module to a destination external to said router;

5           detecting a failure of said first egress module;  
6           in response to said failure of said first egress module, directing a message to said  
7 ingress module informing said ingress module of said first egress module failure;  
8           in response to said message, selecting an alternate egress module capable of  
9 forwarding information to said destination; and  
10          sending a future set of information from said ingress module to said alternate  
11 egress module for forwarding to said destination;  
12          wherein said first set of information and said future set of information are both  
13 part of a flow, wherein said first egress module and said alternate egress module are  
14 predetermined, wherein identifiers associated with said first egress module and said  
15 alternate egress module are stored within a flow block associated with said flow, and  
16 wherein selecting said alternate egress module comprises:  
17          accessing said flow block to access the identifier associated with said alternate  
18 egress module.

1           138. (New) The method of claim 137, further comprising:  
2           in response to said message, preventing other sets of information associated with  
3 said flow from being sent from said ingress module to said first egress module by storing  
4 an indication in said flow block that all sets of information associated with said flow are  
5 not to be sent to said first egress module.

1           139. (New) The method of claim 137, further comprising:

2 in response to said message, causing other sets of information associated with said  
3 flow to be sent from said ingress module to said alternate egress module by storing an  
4 indication in said flow block that all sets of information associated with said flow are to  
5 be sent to said alternate egress module.

1 140. (New) A method, implemented within a router of a network, for  
2 recovering from a failure, comprising:  
3 sending a first set of information from an ingress module to a first egress module  
4 for forwarding by said first egress module to a destination external to said router;  
5 detecting an external failure beyond said first egress module;  
6 in response to said external failure, directing a message to said ingress module  
7 informing said ingress module of said external failure;  
8 in response to said message, selecting an alternate egress module capable of  
9 forwarding information to said destination; and  
10 sending a future set of information from said ingress module to said alternate  
11 egress module for forwarding to said destination;  
12 wherein said first set of information and said future set of information are both  
13 part of a flow, wherein said first egress module and said alternate egress module are  
14 predetermined, wherein identifiers associated with said first egress module and said  
15 alternate egress module are stored within a flow block associated with said flow, and  
16 wherein selecting said alternate egress module comprises:  
17 accessing said flow block to access the identifier associated with said alternate  
18 egress module.



1           141. (New) The method of claim 140, further comprising:  
2           in response to said message, preventing other sets of information associated with  
3           said flow from being sent from said ingress module to said first egress module by storing  
4           an indication in said flow block that all sets of information associated with said flow are  
5           not to be sent to said first egress module.

1           142. (New) The method of claim 140, further comprising:  
2           in response to said message, causing other sets of information associated with said  
3           flow to be sent from said ingress module to said alternate egress module by storing an  
4           indication in said flow block that all sets of information associated with said flow are to  
5           be sent to said alternate egress module.

1           143. (New) A router, comprising:  
2           an ingress module;  
3           a first egress module;  
4           an alternate egress module; and  
5           a forwarding mechanism for forwarding information between said ingress  
6           module, said first egress module, and said alternate egress module;  
7           wherein said ingress module sends a first set of information to said forwarding  
8           mechanism to be forwarded to said first egress module, said first set of information  
9           intended to be forwarded by said first egress module to a destination external to said  
10          router, said forwarding mechanism detecting a failure which precludes forwarding of said

11 first set of information to said first egress module, and in response to said failure, said  
12 forwarding mechanism directing a message to said ingress module informing said ingress  
13 module of said failure, and based upon said message, said ingress module determining  
14 that said first egress module has failed, and in response to said message, said ingress  
15 module selecting said alternate egress module and sending a future set of information to  
16 said forwarding mechanism to be forwarded to said alternate egress module, said future  
17 set of information intended to be forwarded by said alternate egress module to said  
18 destination;

19 wherein said first set of information and said future set of information are both  
20 part of a flow, wherein said first egress module and said alternate egress module are  
21 predetermined, wherein said ingress module comprises a memory, wherein identifiers  
22 associated with said first egress module and said alternate egress module are stored  
23 within a flow block associated with said flow, said flow block being stored in said  
24 memory, and wherein said ingress module selects said alternate egress module by  
25 accessing said flow block to access the identifier associated with said alternate egress  
26 module.

1 144. (New) The router of claim 143, wherein said ingress module, in response  
2 to said message, prevents other sets of information associated with said flow from being  
3 sent from said ingress module to said first egress module by storing an indication in said  
4 flow block that all sets of information associated with said flow are not to be sent to said  
5 first egress module.

1           145. (New) The router of claim 143, wherein said ingress module, in response  
2 to said message, causes other sets of information associated with said flow to be sent  
3 from said ingress module to said alternate egress module by storing an indication in said  
4 flow block that all sets of information associated with said flow are to be sent to said  
5 alternate egress module.

1           146. (New) A router, comprising:  
2 an ingress module;  
3 a first egress module;  
4 an alternate egress module; and  
5 a forwarding mechanism for forwarding information between said ingress  
6 module, said first egress module, and said alternate egress module;  
7 wherein said ingress module sends a first set of information to said forwarding  
8 mechanism to be forwarded to said first egress module, said first set of information  
9 intended to be forwarded by said first egress module to a destination external to said  
10 router, said first egress module detecting an external failure which precludes said first  
11 egress module from forwarding said first set of information to said destination, and in  
12 response to said external failure, said first egress module directing a message to said  
13 ingress module informing said ingress module of said external failure, and in response to  
14 said message, said ingress module selecting said alternate egress module and sending a  
15 future set of information to said forwarding mechanism to be forwarded to said alternate  
16 egress module, said future set of information intended to be forwarded by said alternate  
17 egress module to said destination;

18 wherein said first set of information and said future set of information are both  
19 part of a flow, wherein said first egress module and said alternate egress module are  
20 predetermined, wherein said ingress module comprises a memory, wherein identifiers  
21 associated with said first egress module and said alternate egress module are stored  
22 within a flow block associated with said flow, said flow block being stored in said  
23 memory, and wherein said ingress module selects said alternate egress module by  
24 accessing said flow block to access the identifier associated with said alternate egress  
25 module.

1 147. (New) The router of claim 146, wherein said ingress module, in response  
2 to said message, prevents other sets of information associated with said flow from being  
3 sent from said ingress module to said first egress module by storing an indication in said  
4 flow block that all sets of information associated with said flow are not to be sent to said  
5 first egress module.

1 148. (New) The router of claim 146, wherein said ingress module, in response  
2 to said message, causes other sets of information associated with said flow to be sent  
3 from said ingress module to said alternate egress module by storing an indication in said  
4 flow block that all sets of information associated with said flow are to be sent to said  
5 alternate egress module.

1 149. (New) A method implemented by an ingress module in a router,  
2 comprising:

3           sending a first set of information to a first egress module, said first set of  
4   information intended to be forwarded by the first egress module to a destination external  
5   to the router;

6           receiving a message indicating that said first set of information did not reach the  
7   destination successfully;

8           determining based upon said message whether future sets of information should  
9   be sent to the first egress module;

10          in response to a determination that future sets of information should not be sent to  
11   the first egress module, selecting an alternate egress module capable of forwarding  
12   information to the destination; and

13          sending a future set of information to the alternate egress module to be forwarded  
14   by the alternate egress module to the destination;

15          wherein said first set of information and said future set of information are both  
16   part of a flow, wherein said first egress module and said alternate egress module are  
17   predetermined, wherein identifiers associated with said first egress module and said  
18   alternate egress module are stored within a flow block associated with said flow, and  
19   wherein selecting the alternate egress module comprises:

20          accessing said flow block to access the identifier associated with the alternate  
21   egress module.

1           150.   (New) The method of claim 149, further comprising:

2           in response to a determination that future sets of information should not be sent to  
3   the first egress module, preventing other sets of information associated with said flow

4 from being sent to the first egress module by storing an indication in said flow block that  
5 all sets of information associated with said flow are not to be sent to the first egress  
6 module.

1 151. (New) The method of claim 149, further comprising:  
2 in response to a determination that future sets of information should not be sent to  
3 the first egress module, causing other sets of information associated with said flow to be  
4 sent to the alternate egress module by storing an indication in said flow block that all sets  
5 of information associated with said flow are to be sent to the alternate egress module.

1 152. (New) An ingress module in a router, comprising:  
2 a mechanism for sending a first set of information to a first egress module, said  
3 first set of information intended to be forwarded by the first egress module to a  
4 destination external to the router;  
5 a mechanism for receiving a message indicating that said first set of information  
6 did not reach the destination successfully;  
7 a mechanism for determining based upon said message whether future sets of  
8 information should be sent to the first egress module;  
9 a mechanism for selecting, in response to a determination that future sets of  
10 information should not be sent to the first egress module, an alternate egress module  
11 capable of forwarding information to the destination; and  
12 a mechanism for sending a future set of information to the alternate egress module  
13 to be forwarded by the alternate egress module to the destination;

14 wherein said ingress module comprises a memory, wherein said first set of  
15 information and said future set of information are both part of a flow, wherein the first  
16 egress module and the alternate egress module are predetermined, wherein identifiers  
17 associated with the first egress module and the alternate egress module are stored within a  
18 flow block associated with said flow, said flow block being stored in said memory, and  
19 wherein the mechanism for selecting the alternate egress module comprises:  
20 a mechanism for accessing said flow block to access the identifier associated with  
21 the alternate egress module.

1 153. (New) The ingress module of claim 152, further comprising:  
2 a mechanism for preventing, in response to a determination that future sets of  
3 information should not be sent to the first egress module, other sets of information  
4 associated with said flow from being sent to the first egress module, the mechanism for  
5 preventing comprising a mechanism for storing an indication in said flow block that all  
6 sets of information associated with said flow are not to be sent to the first egress module.

1 154. (New) The ingress module of claim 152, further comprising:  
2 a mechanism for causing, in response to a determination that future sets of  
3 information should not be sent to the first egress module, other sets of information  
4 associated with said flow to be sent to the alternate egress module, the mechanism for  
5 causing comprising a mechanism for storing an indication in said flow block that all sets  
6 of information associated with said flow are to be sent to the alternate egress module.